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EP 0903405 A2 **EP 0798230 A2** **US 4397391 A**
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(54) Abstract Title
Detergent packaging system

(57) Packaging contains three or more fully formulated detergent products which are separated from one another using physical barrier means. The detergent products may differ from one another and the package be used for consumer testing, especially of textile washing products. A unit dose of each product may be provided and be in tablet form or in a sachet which may be water soluble. The barrier means may be moulded partitions 5 in the base part 4 of a box having a hinged lid (3), and/or may be secondary packaging.

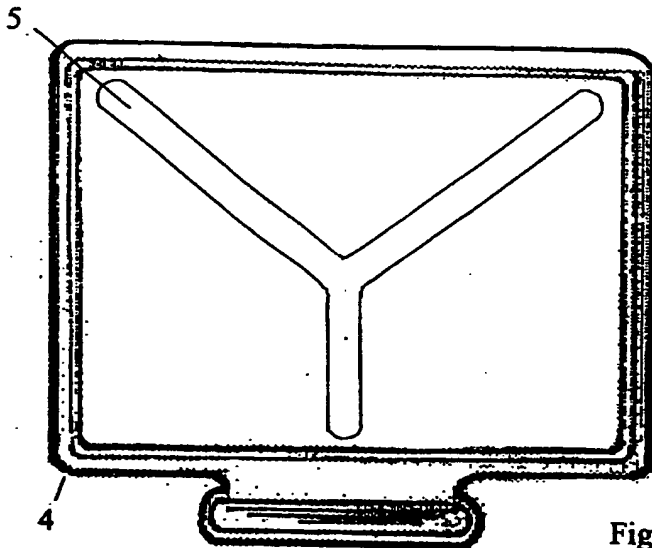


Fig. 4

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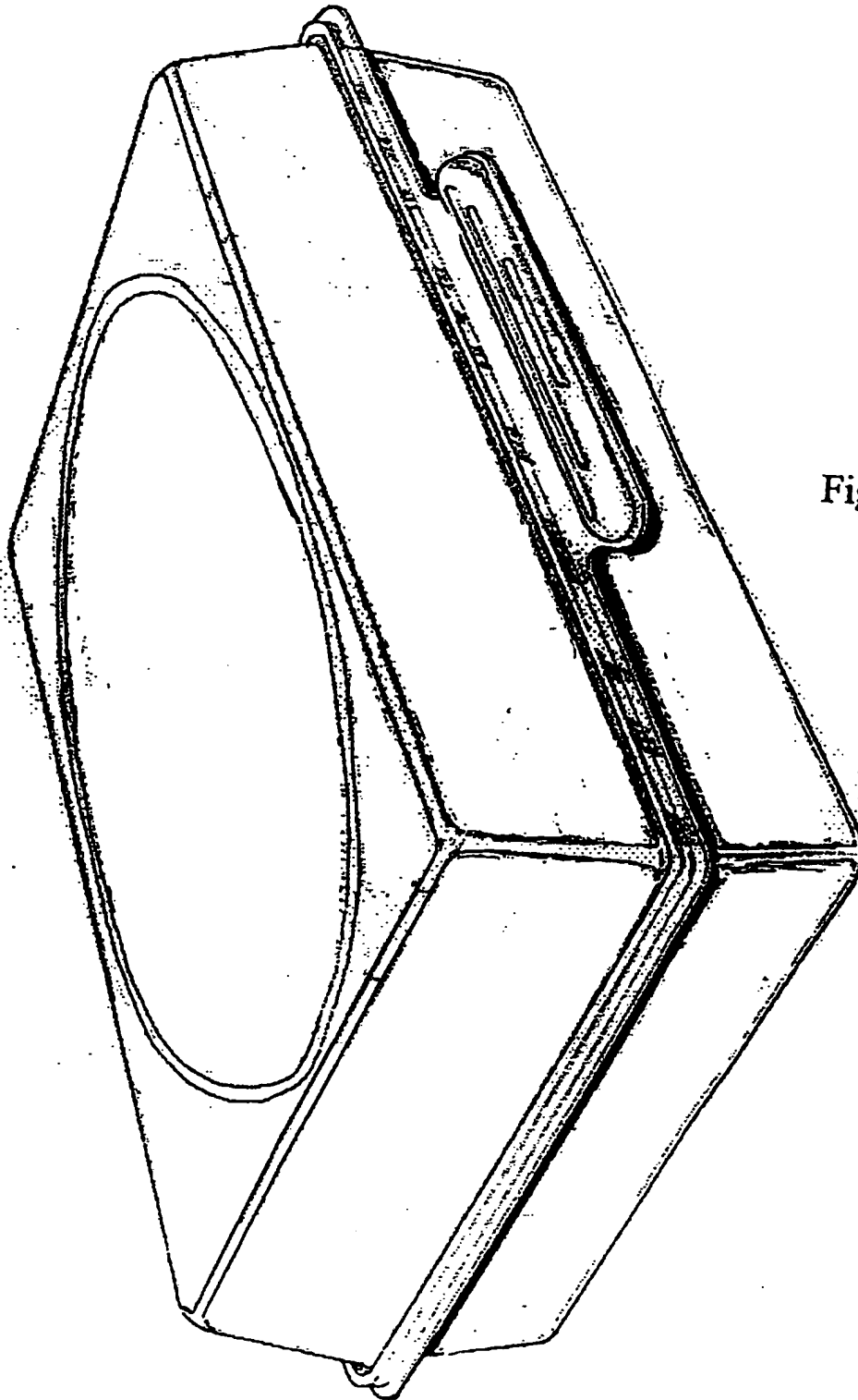


Fig. 1

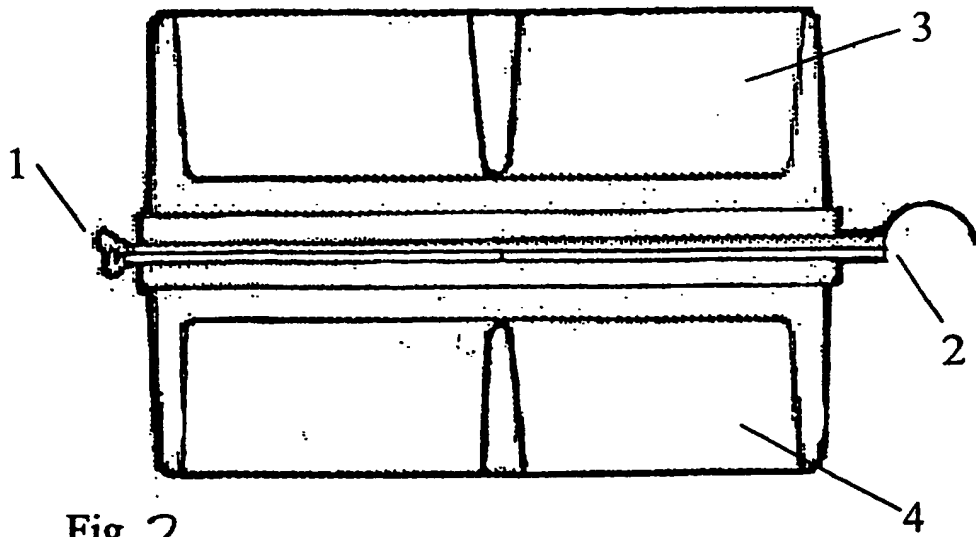


Fig. 2

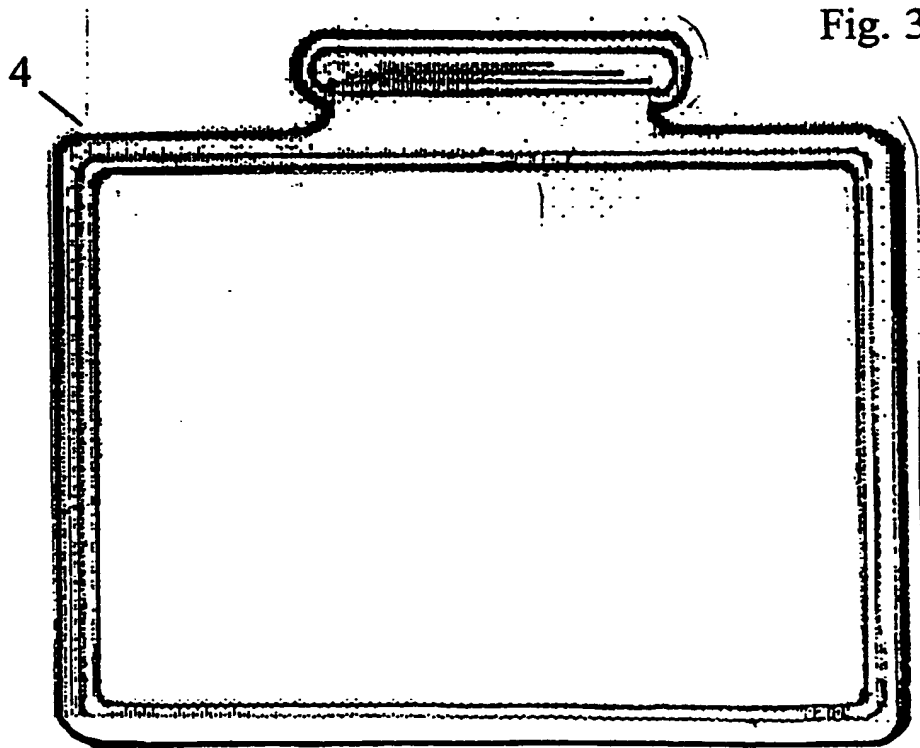


Fig. 3

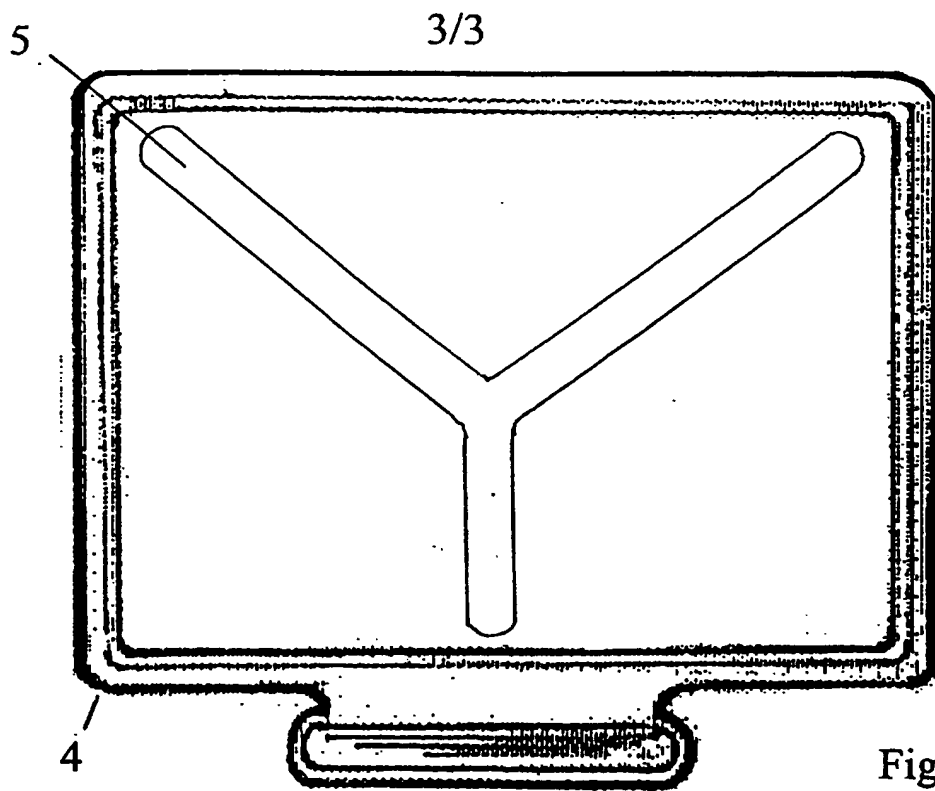


Fig. 4

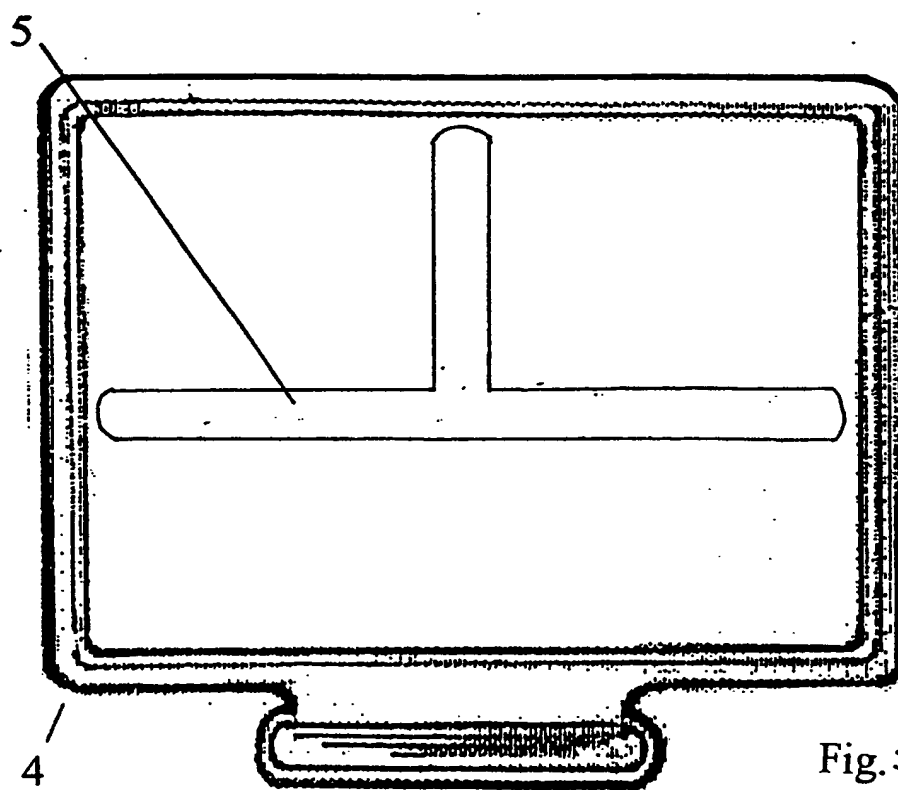


Fig. 5

Detergent Packaging System

The present invention relates to a system for packaging detergents compositions where three or more fully formulated products are presented in one package.

The detergents market has matured over recent years and market segmentation in to various product variants has occurred as a means of gaining competitive advantage between suppliers. This segmentation is based upon identifying the various perceptions of customers as to the primary function or benefit they wish to receive from the use of a washing product. Hence, biological, non-biological, colour, fabric conditioning and delicates textile wash segments have emerged along with various permutations of these primary attributes. This has led to the consumer being offered a wide variety of product forms often substantially duplicated between different brands and all presented on the supermarket shelf. The result has been that consumers tend to adopt one, two or rarely three such products for regular use as a strategy for dealing with the complexity and confusion that this situation gives rise to. The benefit of having a plethora of specialised products is therefore lost. Various initiatives by the industry to educate the consumer have been tried but with little evident success. Publicity material being a prime tool but evidence suggests that this is rarely read thoroughly. The industry has therefore considered technical ways to solve the problem of effective portfolio detergent use. The most prominent approach, pioneered in Germany, has been the 'Baukasten' type systems where the consumer is given a selection of detergent 'building blocks' from which they effectively formulate their own detergent for each wash. The complexity of this has left this approach as a niche market and has failed to either improve wash results or educate the consumer.

The need for proper use of detergents can be illustrated by the fact that 60% of all consumers essentially use only a biological textile washing detergent. However, most consumers possess wool, silk or highly coloured garments which need washing. Biological products can damage these garments, this results in consumer complaints, which whilst unjustified are nevertheless undesirable. Since, the various products in the detergents portfolio are 'targeted' for specific uses, the consumer inevitably receives unsatisfactory results in many instances as they do not possess the full portfolio of products.

For promotional purposes it is the sometimes the practice to wrap two products together, the

motivation for this is 'buy one get one free' and similar approaches to increase sales and no attempt is given to interrelate the products on an in use level. Sachet products containing two complimentary products, for example a main wash detergent in one sachet and a fabric conditioner in another have been described but are difficult to produce as evidenced by their lack of commercialisation.

It is an object of the present invention to overcome the above mentioned disadvantages.

According to the present invention there is provided a packaging system for detergents in which three or more fully formulated products are packaged together each being physically separated from the other using a physical barrier.

Preferably the detergents will be in separate compartments with a lid on each and the detergent will more preferably be in the form of a unit dose, even more preferably contained in secondary packaging and are most preferably be in a solid, optimally tablet, form.

When such an arrangement is used by the consumer it has been surprisingly found that consumers find the product more convenient to use, it increases their awareness of the product types and hence their wash results without giving evidence that the arrangement was considered inconvenient. In addition the pack is proportionally smaller than if individual products are bought separately and is therefore more environmentally acceptable.

In particular the unexpected technical benefit of reducing the incidence of garment damage experienced by consumers was identified.

Packaging

A packaging system is any system which serves to keep the components to be packaged from coming into physical contact with one another during transportation, handling and storage.

The primary packaging system any which serves to keep the components to be packaged from coming into physical contact with one another during transportation, handling, storage and during normal use conditions and which also provides physical stability, at least partial water resistance

and is preferably substantially rigid in construction.

Suitable packaging materials include low and high density polyethylene, polypropylene, polystyrene and polyvinyl alcohol. Other suitable materials include cardboard, paper, board, wood and sheet metal.

Any suitable materials for the packaging may be used, however, suitable materials are typically derived from vinyl monomers with a range of hydrophobicities, copolymers and homopolymers with a variety of end groups may be chosen. The choice being primarily based on the physical characteristics of the material. Suitable materials include, ethylene, propylene, butylene and other alkenic derivatives, vinylidene chloride derivatives and polyester derivatives. Cellulosic derivatives, such as Cellophane, methylated celluloses, polystyrene and polyamides (eg Nylon 6.6) are also considered.

Polyethylene as high and low density and polypropylene are particularly suitable materials imparting both a water vapour barrier and strength to the laminated film are particularly preferable. Both high and low density polyethylene is suitable and molecular weights within the range 10,000 to 10,000,000, whilst requiring different processing methods are within the scope of the invention.

Any secondary packaging system is any which serves to keep the components to be packaged from coming into physical contact with one another during transportation, handling, storage but is either discarded before product use or more preferably breaks down in product use, even more preferably to act as a detergent component in its own right.

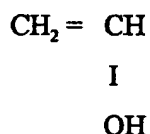
Suitable materials for substantially insoluble secondary packaging are as listed above for the primary packaging. However, the grade of material will typically be thinner and polymer sheets and films, particularly as a flow wrap, are preferred.

Suitable materials for substantially soluble secondary packaging include polymers, copolymers, and polymeric mixtures including vinyl alcohol and vinyl acetate polymers, polymers resulting from alpha, beta unsaturated carboxylic acid monomers, polymers resulting from alkyl or

aliphatic esters of alpha, beta unsaturated carboxylic ester monomers, oxyalkylene polymers and copolymers have been found especially preferable are vinyl alcohol and vinyl acetate copolymers,

Polyvinyl Alcohols and Acetates

Polymeric vinyl alcohol or polyvinyl alcohol (PvOH), is a polyhydroxy polymer having a polymethylene backbone with pendent hydroxy groups. PvOH is a water soluble synthetic resin. It is typically produced by the hydrolysis of polyvinyl acetate as the theoretical monomer is unstable



Polyvinyl alcohol is commonly available as film, a dry solid and is available in granular or powder form. PvOH grades include a 'super' hydrolysed form (99.3% + removal of the acetate groups), a fully hydrolysed form (99%+ removal of the acetate groups), a form of intermediate hydrolysis (about 98 to 991% removal of the acetate groups), and partially hydrolysed (about 91 to 85% removal of the acetate groups) polyvinyl alcohol.

The properties of the resins vary according to the molecular weight of the parent polymer and the degree of hydrolysis. Polyvinyl alcohols are commonly produced in nominal number average molecular weights that range from about 20,000 to about 200,000. Commonly, the molecular weight of the commercial polyvinyl alcohol grades is reflected in the viscosity of a 4 wt-% solution measured in centipoise (cP) at 20 .degree. C with a Brookfield viscometer. The viscosity of a 4% solution can range from about 5 to about 65cP. Variation in film flexibility, water sensitivity, ease of solvation, viscosity, block resistance, adhesive strength, dispersing power, can all be varied by adjusting the molecular weight or degree of hydrolysis.

Solutions of polyvinyl alcohol in water can be made, for example, with lower alcoholic co-solvents and salt co solutes. Polyvinyl alcohol can react with aldehydes to form acetals, can be reacted with acrylonitrile to form cyanoethyl groups, and can be reacted with ethylene and

propylene oxide to form hydroxy alkaline groups. Polyvinyl alcohols can be readily cross linked and can be borated to effect gelation.

Polyvinyl alcohol is made by first forming polyvinyl acetate or vinyl acetate containing copolymer such as an ethylene vinyl acetate copolymer and removing the acetate groups using a base catalysed alkanolysis. The production of polyvinyl acetate or a vinyl acetate copolymer can be done by conventional processes which control the ultimate molecular weight. Catalyst selection, temperatures, solvent selection and chain transfer agents can be used by persons skilled in the art to control molecular weight. The degree of hydrolysis is controlled by preventing the completion of the alkanolysis reaction.

Such chemical and physical factors will be utilised by te person skilled in the art to modify film strength, hydrophobicity, solubility rate, glass transition temperature and moisture vapour transmission rate for example to optimise the film for a specific application.

Unsaturated Carboxylic Acids and Esters

The polymeric films of the invention may also result from the polymerization or copolymerization of monomeric alpha, beta unsaturated carboxylic acid or monomeric esters of alpha, beta unsaturated carboxylic acid. Suitable monomers include those containing a carboxylic acid or carboxylate group as a functional group and include a vinyl monomer having a free carboxylic acid or carboxylate functional group. Preferred carboxylic acid containing vinyl monomers for use in this invention comprises for example, 1, 4-vinyl benzoic acid, vinyl alcohol esters of dicarboxylic acids, alpha, beta unsaturated carboxylic acids and dicarboxylic acids, and others.

The most preferred carboxylic acid containing monomers comprises alpha, beta unsaturated carboxylic acids including methacrylic acid, acrylic acid, itaconic acid, iconatic acid, cinnamic acid, crotonic acid, mesaconic acid, carboxyethyl acrylic acid, maleic acid, fumaric acid, and the like.

Also useful if the synthesis of an acrylic copolymeric film useful in this invention include esters

of alpha, beta unsaturated carboxylic acid such as methacrylic acid, acrylic acid, itaconic acid, iconatic acid, cinnamic acid, crotonic acid, mesaconic acid, carboxyethyl acrylic acid, maleic acid, fumaric acid, and the like. Alkyl esters of alpha, beta unsaturated carboxylic acids can be used in combination with the alpha, beta unsaturated carboxylic acid containing monomers mentioned above.

The alkyl esters may be selected from higher (alkyl) esters such as those of about 5-22 carbon atoms. Examples of C_{5-22} compounds include hexyl, octyl, ethyl (hexyl), isodecyl, and lauryl, acrylates and methacrylates and itaconates. Alkyl esters having branched as opposed to straight chain moieties are also useful in the present copolymers.

Polymer films resulting from these monomers can be prepared by carrying out the polymerization of the mixture of monomer and solvent or solvent mixture such as those processes known to those of skill in the art.

Such chemical and physical factors will be utilised by te person skilled in the art to modify film strength, hydrophobicity, solubility rate, glass transition temperature and moisture vapour transmission rate for example to optimise the film for a specific application.

Poly Ethylene Oxides

An additional family of monomers which has been found useful in producing the copolymer film of the present invention are the polymeric ethylene oxide. Generally, ethylene oxide has the formula: $H(OCH_2CH_2)_nOH$.

Polyethylene oxides are generally clear viscous liquids, or depending on molecular weight and moles of ethylene oxide, white solids which dissolve in water forming transparent solutions. Polyethylene oxide is soluble in many organic solvents and readily soluble in aromatic hydrocarbons while only slightly soluble in aliphatic hydrocarbons. Polyethylene oxides are generally classified not only by moles of ethylene oxide present within the composition, but also by molecular weight.

Other soluble polymeric materials

Suitable monomers for producing addition polymers, copolymers with like monomers or other vinyl monomers previously disclosed consist of vinyl imidazole, N-vinyl imidazole, methyl vinyl imidazole, N-vinyl oxazolidone, vinyl pyridine-N-oxide, 4-vinyl-pyridine-N-oxide, vinyl pyrrolidone. Such polymers have the additional benefit of giving in-wash anti-dye transfer properties. Molecular weights of upwards of 10,000 are suitable, but if their primary function is mechanical strength, ie they compose more than 25 w/w% of the soluble layers wherein that layer is the primary contributor to film strength molecular weights of greater than 50,000 are preferred.

Primary Packaging format

Specific embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings which:

Figure 1 is a perspective diagrammatic representation of the packaging.

Figure 2 is a diagrammatic representation of a side view of the container

Figure 3 is a diagrammatic representation of a plan view of the bottom half of the comparative container of the invention.

Figure 4 is a diagrammatic representation of a plan view of the bottom half of one embodiment of the container of the invention.

Figure 5 is a diagrammatic representation of a plan view of the bottom half of a second, preferred embodiment of the container of the invention.

Referring now to Figure 2, the container has top 3 and bottom halves, joined by a linkage 1 and optionally held closed by a closure device 2 with optionally combined handle portion.

Referring now to Figure 3, a plan view showing no internal dividers.

Referring now to Figures 4 and 5 the bottom halves 4 of the container are subdivided by a raised moulded portion 5 up to 3/4 the depth of the container. The areas defined between the moulded portions being used to accommodate the detergent products.

Detergent

The detergent suitable for use in the invention includes any fully formulated detergent preferably in a solid or substantially solid form.

Solid forms within the scope of the invention include, tablets, briquettes, blocks, bars, shaped bodies, extrudates, powders, granules, dusts, marumes and prills.

A fully formulated detergent is one which in its composition contains all the chemical components suitable for carrying out a normal washing operation. By example, a standard biological detergent as sold would be such a product as that product and only that product need be added to a washing liquid in order to successfully perform a normal washing operation. For the purposes of the invention water soluble films which are used as secondary packaging for a product to be used for aqueous washing are considered to constitute part of such a formulation as they are capable of being integrated into the washing action of the composition. This applies similarly to solvent soluble films when used in dry cleaning operation.

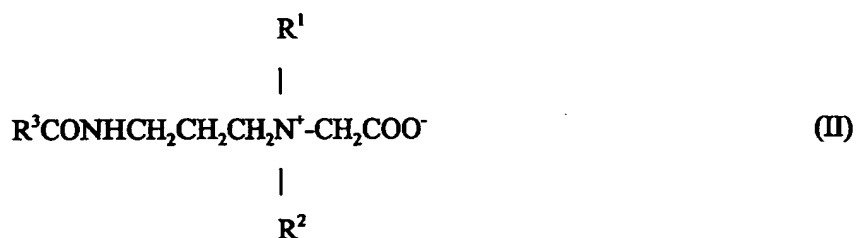
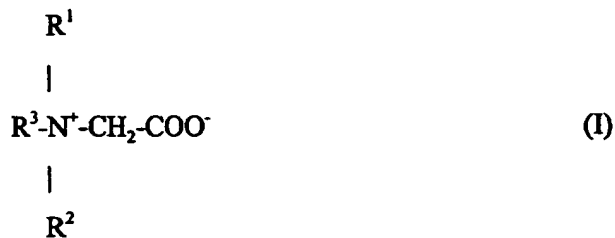
What is not claimed are compositions where a number of components are added to a washing liquid by the consumer in order to constitute an effective washing medium. By example, industrial detergents where individual detergent components of alkali, bleach, enzyme and surfactant may be added separately are excluded. Similarly systems where one fully formulated detergent is used to which subsidiary 'boosters' are added, for example, whiteners, bleaches, water softeners are also considered to be out with the scope of the invention.

The detergent formulation in accordance with the invention will include at least one surface active agent which may, for example, be an anionic, cationic, non-anionic or amphoteric surface active agent. Any of the surface active agents widely used in detergent formulations may be employed in the present invention. Such agents are typically employed in amounts of from 1 to 25% by weight.

If an amphoteric surface active agent is used it may be present in the formulation in an amount of 0.1 to 10% by weight, more preferably 0.5 to 5%, even more preferably 1 to 4% on the same

basis.

The amphoteric surface active agent may be betaine surface active agent. Preferred betaines may be either of the formula (I) or (II).



In the above formula, R^1 and R^2 may be the same or different C_{1-4} alkyl groups whereas R^3 is an alkyl group having 8-22 carbon atoms, more preferably 12 to 18 carbon atoms e.g. mixed C_{10} to C_{14} .

The preferred betaine for use is cocoamidopropyl betaine.

An alternative amphoteric surface active agent for use in the formulation of the invention is a glycinate of the formula



where R^3 is as defined above.

Other suitable materials are as given in chapter 1 of "Amphoteric Surfactants", e.g. Lomax Ed,

Marcel Decker, New York 1996.

It is highly preferred that a cationic surface active agent is employed in conjunction with the amphoteric surface active agent. The cationic surface active agent is preferably used in an amount of up to 6% by weight of the formulation and is conveniently added in conjunction with a clay especially as herein described. Examples of suitable cationic surface active agents include quaternary ammonium salts having three lower (C_{1-4}) alkyl groups (preferably methyl groups) and a long chain (C_{8-20}) alkyl group, e.g. coco trimethyl ammonium chloride. Further examples include alkyl pyridinium salts and other compounds in which the nitrogen atom of the pyridine assumes a quaternary form, e.g. as in an alkyl pyridinium bromide. Cationics with C10 to C20, more preferably with, C12 to C18 alkyl chains are preferred.

Further examples of cationic surface active agents which may be used include amine and imidazoline salts.

If an anionic surface active agent is used then it is preferably present in the formulation in an amount of up to 20%, more preferably up to 10%, even more preferably up to 5% by weight of the formulation. Examples of anionic surface active agents which may be employed include alkylaryl sulphonates, alkyl sulphates, ether sulphates and ether carboxylates all as conventionally employed in laundry detergent formulations. Di-anionic surfactants are noted as being particularly useful. Anionics with C10 to C20, more preferably with, C12 to C18 alkyl chains are preferred.

If a non-ionic surface active agent is used then it is preferably present in an amount of up to 20% by weight of the formulation, more preferably 2 to 10% on the same basis. Examples of non-ionic surface active agents which may be used include alkoxylates, ethylene oxide/propylene oxide block copolymers, alkanolamides (e.g. monoethanolamides and diethanolamides), esters and amine oxides. Non-ionics with C10 to C20, more preferably with, C12 to C18 alkyl chains are preferred.

The surfactant can be present at up to 25%, more preferably between 1% and 20%. For textile washing compositions the most preferable range is between 10 and 20% and for hard surface cleaning between 1 and 5% and for fabric refresher and air freshener products less than 1%. The

preferred surfactant is one carrying an electrical charge, most preferably an amphoteric or anionic surfactant.

Additional detergent components

Builder

The formulation may include at least one builder salt in a total amount of 0.1% to 50% by weight of the formulation. Mixtures of builder salts are typically employed. The builder may be for example be an alkali metal phosphate or alkali metal carbonate. The person skilled in the art will select a suitable combination of phosphates from ortho, pyro and triphosphates. In particular alkali metal triphosphates with a Phase 1 content of greater than 40% are preferable for applications requiring rapid dissolution, whereas for applications requiring slow release a Phase 2 content of greater than 40% is desirable. Similarly the degree of hydration of the salts will be chosen, salts with less than 5% water of hydration are preferred. Other suitable builders are zeolites, citric acid, nitrilo tri-acetic acid, Alkali metal carbonates or sodium citrate. Zeolites X, Y and MAP are all considered suitable.

Polymeric components

A number of polymeric components will typically be considered for use as part of compositions within the scope of the invention.

A variety of water soluble polymers may be added to perform variety of functions. For example as thickeners and anti scaling agents.

Suitable polymers include, Addition polymers - e.g. Poly Vinyl ; ethers, esters, amides, carboxylates, maleates, methacrylates, acrylates, alcohols, acetates, sulphonated polymers and amphoteric polymers and copolymers thereof. In particular block copolymers, homo polymer and copolymer prepared using vinyl carboxylates in combination with monomer selected from the group consisting of (meth)acrylonitrile, 2-trimethylsiloxyethyl (meth)acrylate, 2-ethylhexyl (meth)acrylate, 2-trimethyl-siloxyethyl (meth)acrylate, 2-ethylhexyl (meth)acrylate, 2-ethoxyethyl (meth)acrylate, sorbyl (meth)acrylate, butyl (meth)acrylate, ethyl (meth)acrylate, glycidyl (meth)acrylate, hexyl (meth)acrylate, hexyl (meth)acrylate, hydroxyethyl

(meth)acrylate, hydroxypropyl (meth)acrylate, (meth)acrylonitrile, lauryl (meth)acrylate, methyl (meth)acrylate, octyl (meth)acrylate, p-tolyl (meth)acrylate, phenyl (meth)acrylate, propyl (meth)acrylate, sorbyl (meth)acrylate, and stearyl (meth)acrylate, may be used. Homo and block polymers of the above monomers are particularly suitable for use in the inks of the invention.

Other suitable polymers include condensation polymers - eg Poly ; esters, and urethanes, gelatin, Carrageen, Gum Arabic (eg grade NF FCC ex Sarcom Inc), Agar (eg Agar-Agar NF FCC Gel 10 ex Sarcom Inc), Guar Gum (eg Powder HV-101 NF FCC ex Sarcom Inc), Locust Bean Gum (eg SG-14 FCC ex Sarcom Inc), Ghatti Gum (eg #1 FCC ex Sarcom Inc), Karaya Gum (eg #1 FCC ex Sarcom Inc), Karaya Gum (eg #1 FCC ex Sarcom Inc), Xanthan Gums (eg XAN-90 NF FCC ex Sarcom Inc.) and alginates.

Particularly preferred polymers are the Chitins, Chitosan and derivatives for their synergistic potentiation of antibacterial efficacy in combination with the organic bactericides as specified in Annex 1 of the Biocidal Products Directive of the EC.

Preferred molecular weights are from 5,000 to 100,000. More preferably from 10,000 to 30,000. Suitable polymeric materials known in the art are Hydrogenated castor oils (eg Croduret 50 ex Croda), acrylic acid polymers (eg ex National Starch) Acrylate maleate polymers (eg Sokolan CP-5 and CP-10 ex BASF) and poly ethylene glycols (eg ex Hoechst), poly vinyl pyrrolidone (eg K50 ex ISP), Carbopol (ex 3V). Suitable levels of polymer inclusion are between 0.1 to 10% more preferably between 0.2 and 2% most preferably between 0.3 and 1.2%.

A variety of substantially water insoluble polymers may be added to perform a variety of functions for example soil release agents and tablet excipients. Eg polyoxyethylene terephthalate, polyethylene terephthalate and cellulose and its hydroxy alkyl and carboxy alkyl derivatives. Such materials when incorporated in liquid compositions within the scope of the invention are preferably used with a particle size of from 0.1 to 50 μ m, more preferably from 1 to 10 μ m. When used in solid detergents compositions they are preferably used with a size from 200 to 3000 μ m. More preferably from 500 to 2000 μ m, most preferably from 800 to 1200 μ m.

Bleaches

A bleaching composition may also be included. The preferred bleaching system for use in the invention comprises a hydrogen peroxide precursor compound and the bleach activator as known in the art which is capable of reacting with the hydrogen peroxide to generate a peracid.

The hydrogen peroxide precursor compound may, for example, be an inorganic persalt e.g. a perborate (in the monohydrate and/or tetra hydrate form), a percarbonate or a persulphate. The alkali metal salts of these compounds are preferred, particularly sodium and potassium salts. Alternatively in the case where the detergent formulation is in solid form, the bleaching agent may be a urea-hydrogen peroxide complex. In the case of a liquid formulation the hydrogen peroxide precursor compound may be hydrogen peroxide *per se*. Pre-formed per acids known in the art are also considered suitable.

Specific examples of pre-formed per acids bleaches which may be used in the detergent formulations of the invention include phthalimido peroxihexanoic acid eg Eureco (TM) ex Ausimont) and diphthaloyl peroxide.

Specific examples of bleach activators which may be used in the detergent formulations of the invention include tetra acetyl ethylene diamine, hexa acetyl sorbitol, hexa acetyl mannitol, penta acetyl glucose and octa acetyl sucrose. Particularly preferred are hexa acetyl sorbitol and hexa acetyl mannitol which may be used in admixture, e.g. as disclosed in EP-A-0 525 239. Further examples are compounds having nitrogen atoms in the basic carbohydrate skeleton, e.g. the peracetylated forms of N-methyl gluconamide, N-methyl glucamine and glucopyranosyl amine. It is considered particularly preferable to combine such bleach activators and such pre-formed per acids with one another to promote antibacterial and bleachable stain and soils cleaning. Particularly preferred combinations are of per acetic acid precursors with precursors of higher alkyl peracids such as fall in the range propyl to behenate. Particularly preferred are the branched alkyl analogues of such materials.

Chlorine bleaches may also be employed either as a hypochlorite, for example, an alkali metal hypochlorite or as a precursor compound such as Trichloro iso cyanuric acid, sodium dichloro isocyanurate and its di hydrate (eg Oxidan (TM) DCN/WSG ex Sigma). Such systems may be used in conjunction with a suitable catalyst for example as described in EP 937 772 (Procter).

Effervescent systems

An effervescent system may be employed. Suitable agents include a mixture of an acid and an alkali metal carbonate or bicarbonate, for example citric acid and sodium carbonate. Sodium percarbonate peroxohydrate (eg ex Eka chemicals) is also considered.

Clays

A clay may be used in the composition, either per se or as a carrier for the perfume. The clay which is used in the formulation of the invention may be any one of the fabric softening clays having fabric softening properties used in laundry detergent formulations. Such clays are generally of the "lamellar type" and are such that the layers "separate" to become deposited on the garments being washed. The clay may for example be a Smectite such as a Laponite, Bentonite, Montmorillonite, Hectorite or Saponite. For example, the clay may be a Sodium Montmorillonite, a Sodium Hectorite, a Sodium Saponite, a Calcium Montmorillonite or a Lithium Hectorite.

Softener components

The term "fabric softening agent" as used herein includes cationic and nonionic fabric softeners used alone and also in combination with each other. A preferred fabric softening agent of the present invention is a mixture of cationic and nonionic fabric softeners. Examples of fabric softening agents that are especially suitable for use in the invention include the compositions described in US 4,103,047, US 4,237,155, US 3,686,025, 3,849,435 and U.S. 4,073,996. Said patents are hereby incorporated herein by reference. Another preferred type of fabric softener is described in detail in U.S. Pat. No. 4,661,269 (Procter), said patent being incorporated herein by reference. Examples of nonionic fabric softeners are the sorbitan esters, C12 - C26 fatty alcohols, and fatty amines described herein. More biodegradable fabric softener compounds can be desirable. Biodegradability can be increased, e.g., by incorporating easily destroyed linkages into hydrophobic groups. Such linkages include ester linkages, amide linkages, and linkages containing unsaturation and/or hydroxy groups. Examples of such fabric softeners can be found in US patents 3,408,361, 4,709,045, 4,233,451, 4,127,489, 3,689,424, 4,128,485, 4,161,604,

4,189,593, 4,339,391, said patents being incorporated herein by reference.

Enzymes

An enzyme may be included in the composition. The enzyme may, for example, be a protease, amylase, lipase, an endo and exo cellulases, cholesterol oxidases (particularly as described in WO 99/45106 (Meiji Seika)) or mixtures thereof such as commonly used in detergent formulations. Examples of suitable enzymes are available under the names Opticlean (TM), Savinase (TM), Esperase (TM); Termamyl (TM), Maxamyl (TM), Lipomax (TM), Lipolase (TM); Celluzyme (TM) and Carezyme (TM). The amount of enzyme incorporated in the formulation will depend on activity but will typically be 0.1 to 3%. This level is particularly suitable for Savinase 6.0T, Termamyl 60T, Celluzyme 0.7T and Lipomax.

It is a highly preferred aspect of the invention that bactericides listed in table 1 be combined with one or more enzymatic components. The person skilled in the art will readily identify those materials from table 1 which do not significantly inhibit enzymatic activity and thereby identify those where synergistic bactericidal effects are obtained.

Additional optional components

It will be appreciated that the formulation may incorporate additional components as conventionally included in a hard surface cleaner, laundry detergent, fabric refresher, fabric conditioner or similar product.

For a laundry detergent formulation it will be appreciated that the formulation may incorporate additional components as conventionally included. One example of such an additional component is a soap or fatty acid which may be used in an amount of up to 5% by weight as an antifoam or processing aid. Particularly preferred are those with C8 to C22 alkyl chains, more preferably C12 to C12 alkyl and with an iodine value less than 5 more preferably less than 1. Particularly suitable are the Prifac (TM) and Pristerine (TM) materials supplied by Uniquema.

Further examples include anti-foam agents, sequestrants (e.g. of the phosphonate type), whiteness maintenance agents (e.g. CMC, polyoxyethylene terephthalate, polyethylene terephthalate),

colorants (e.g. dyestuffs), perfume, flow control agents (e.g. a sulphate) flow enhancer (e.g. a zeolite), pH regulators (e.g. a carbonate or bicarbonate), anti-corrosion agents, dye transfer inhibitors (e.g. PVP) and optical brighteners (e.g. Tinopal CBS-X and Tinopal DMS-X). These components may, for example, each be present in amounts up to 1% by weight of the formulation.

Cyclodextrins and cyclodextrinoids, optionally as alcohol, amide, ether, ester, hydrophobised, conjugated, granulated, encapsulated and solubilised, derivitised and embodied as such are all envisaged as being potentially incorporated ways of changing their use provided that they retain some ability to complex smaller molecules.

Cyclodextrin incorporation of between 0 and 5%, more preferably between 0.05 and 2%, most preferably between 0.075 and 1.25% is within the scope of the invention.

Perfumes

A perfume will typically be formulated in a product using the invention. The perfume ingredients and compositions of this invention are the conventional ones known in the art. Selection of any perfume component, or amount of perfume, is based on aesthetic considerations. Examples of suitable perfume compounds and compositions can be found in US 4,145,184, US 4,209,417, US 4,515,705, US 4,152,272, all of which are patents being incorporated herein by reference. Many suitable perfume ingredients with odour characteristics, and physical and chemical properties, such as molecular weight and boiling point, are given in "Perfume and Flavour Chemicals (Aroma Chemicals)," Steffen Arctander, 1969, publ., Steffen Arctander incorporated herein by reference. Examples of the highly volatile, low boiling, perfume ingredients are: anethole, benzaldehyde, benzyl acetate, benzyl alcohol, benzyl formate, iso-bornyl acetate, camphene, cis-citral (neral), citronellal, citronellol, citronellyl acetate, para-cymene, decanal, dihydrolinalool, dihydromyrcenol, dimethyl phenyl carbinol, eucalyptol, geranial, geraniol, geranyl acetate, geranyl nitrile, cis-3-hexenyl acetate, hydroxycitronellal, d-limonene, linalool, linalool oxide, linalyl acetate, linalyl propionate, methyl anthranilate, alpha-methyl ionone, methyl nonyl acetaldehyde, methyl phenyl carbonyl acetate, laevo-menthyl acetate, menthone, iso-menthone, myrcene, myrcenyl acetate, myrcenol, nerol, neryl acetate, nonyl acetate, phenyl

ethyl alcohol, alpha-pinene, beta-pinene, gamma-terpinene, alpha-terpineol, beta-terpineol, terpinyl acetate, and vertenex (para-tertiary-butyl cyclohexyl acetate).

Natural or Essential oils are particularly suitable for use in the invention. For example, thymol, eugenol, menthol also tea tree, pineol, eucalyptus, camphor, cedar, oloe vera, citronellol, citrus, lemon, lime, limonene, grapefruit, geranium, mint, peppermint, spearmint, cedarwood, clove, litsea, sassafras, patchouli, coriander oils and the principle sub components thereof.

Also suitable are lavandin, with major components of linalool, linalyl acetate, geraniol and citronellol. Lemon oil and orange terpenes with major components of about 95% d-limonene. Geraniol, menthol and eucalyptus oils include the moderately volatile perfume ingredients: amyl cinnamic aldehyde, iso-amyl salicylate, beta-caryophyllene, cedrene, cinnamic alcohol, coumarin, dimethyl benzyl carbonyl acetate, ethyl vanillin, eugenol, iso-eugenol, flor acetate, heliotropine, 3-cis-hexenyl salicylate, hexyl salicylate, lilial (para-tertiarybutyl-alpha-methyl hydrocinnamic aldehyde), gamma-methyl ionone, nerolidol, patchouli alcohol, phenyl hexanol, beta-selinene, trichloromethyl phenyl carbonyl acetate, triethyl citrate, vanillin, and veratraldehyde. Cedarwood terpenes are composed mainly of alpha-cedrene, beta-cedrene, and other C₁₅H₂₄ sesquiterpenes. Examples of suitable less volatile, high boiling, perfume ingredients are: benzophenone, benzyl salicylate, ethylene brassylate, galaxolide (1,3,4,6,7,8-hexahydro- 4,6,6,7,8,8- hexamethyl-cyclo-penta-gamma-2-benzopyran), hexyl cinnamic aldehyde, lyral (4 - (4 - hydroxy-4-methyl pentyl) - 3 - cyclohexene - 10 - carboxaldehyde), methyl cedrylone, methyl dihydro jasmonate, methyl-beta-naphthyl ketone, musk indanone, musk ketone, musk tibetene, and phenyl ethyl phenyl acetate. Such components are particularly preferred constituents of any perfume composition used in the invention.

It is especially preferred to use a material from table 1 which also exhibits perfumistic characteristics in combination with a perfume, particularly when utilising the aforementioned perfumistic components.

Bactericide

A bactericide may be optionally included in the detergent product or the external carton packaging. Compositions containing bactericide will contain from 5 to 0.0001% bactericide, virucide or anti-microbial agent, preferably from 2 to 0.001%, more preferably from 1 to 0.005% most preferably from 0.1 to 0.01%. Biocides as listed in annex 1 of the Biocidal Products

Directive are considered particularly suitable. Such materials may be used in combination, when used in combination such bactericidal, virucidal or anti-microbial agents will each be present at a level of from 5 to 0.00003% bactericide, virucide or anti-microbial agent, preferably from 3 to 0.0001%, more preferably from 1 to 0.0001% most preferably from 0.1 to 0.001%.

Most preferred are the bactericidal agents in table 1 which are single organic molecules with a molecular weight above 250. Not wishing to be bound by theory such molecules possess lower potential for human toxicity by virtue of their higher molecular weigh and absence of inorganic materials.

Disintegrants

A disintegrant may also be included, for example to aid powder and tablet dispersability. Most preferably any disintegrant is a cellulose based material. Such cellulose based material may for example comprise both crystalline and amorphous cellulose. Examples of suitable materials are disclosed, for example, in WO-A-9855575 (Henkel), WO-A-9840462 (Herzog). The cellulose may be a cross-linked modified cellulose e.g. AC-DI-SOL and/or may comprise micro crystalline cellulose fibres (e.g. HANFLOC). The cellulose based material may be a cellulose derivative which may be cross-linked, e.g. a cross-linked carboxymethyl cellulose.

The disintegrant may be a cellulose derivative, for example a sodium carboxymethyl cellulose. Examples include COURLOSE and NYMCEL. A particularly suitable disintegrant for use in the invention is available under the trade mark NILYN. (ex FMC), grade LX16 which is an internally cross-linked carboxymethyl cellulose.

Further examples of disintegrants which may be used include various starches such as potato, rice, corn ore maize starch. The disintegrant may be a starch derivative, e.g. carboxymethyl starch such as available under the trade mark PRIMOGEL or a sodium starch glycolate such as available under the trade mark EXPLOTAB.

Clays

It is also possible for the disintegrating agent to be a clay. Such clays are generally of the

"lamellar type" and may for example be a smectite such as a Laponite, Bentonite, Montmorillonite, Hectorite or Saponite. For example, the clay may be a Sodium Montmorillonite, a Sodium Hectorite, a Sodium Saponite, a Calcium Montmorillonite or a Lithium Hectorite.

Furthermore, it is possible for the disintegrating agent to be a synthetic polymer, for example a cross-linked polyvinyl pyrrolidone, POLYPLASDONE XL or KOLLIDON XL.

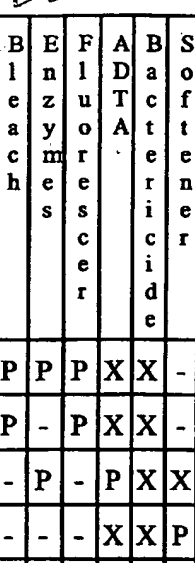
The detergent used in the invention may also contain an optical brighteners or fluorescer. For example Tinopal CBS-X (disodium 2,2'-bis-(phenyl-styryl) disulphonate and Tinopal DMS-X (4,4' bis - (2-morpholino-4-anilino-s-triazin-6-yl amino) stilbene disulphonate) and the various possible alkali metal salts thereof particularly the potassium salts.

It will be appreciated that the formulation may incorporate additional components as conventionally included in a hard surface cleaner, laundry detergent, fabric refresher, fabric conditioner or similar product.

By example, it will be appreciated that the formulation may incorporate additional components as conventionally included in laundry detergent formulation. One example of such an additional component is a soap which may be used in an amount up to 5% by weight as a processing aid. Further examples include anti-foam agents, sequestrants (e.g. of the phosphonate type), whiteness maintenance agents (e.g. CMC, polyoxyethylene terephthalate, polyethylene terephthalate), colourants (e.g. dyestuffs), perfume, flow control agents (e.g. a sulphate) flow enhancer (e.g. a zeolite), pH regulators (e.g. a carbonate or bicarbonate), anti-corrosion agents, dye transfer inhibitors e.g. Poly vinyl pyrrolidone), poly(vinyl pyridine betaines), poly(amine alkoxylate), poly (vinyl imidazole), poly (N-vinyl imidazole), poly (methyl vinyl imidazole), poly (vinyl pyridine-N-oxide) and copolymers thereof and also oxidoreductase dye transfer inhibitors.

Number of fully formulated detergents products

The packaging system within the scope of the invention consists of three or more fully formulated detergents compositions, preferably 4 detergents compositions. Suitable detergents compositions may be chosen from any of those currently marketed. By illustration the types of detergent compositions envisaged will be illustrated with non-limiting indicative examples of which main component types may be present to guide the person skilled in the art as to the terminology being employed.



Textile washing composition (all contain surfactants)	B l e a c h	E n z y m e s	F l u o r e s c e r	A D T A	B a c t e r i c i d e	S o f t e n e r
Biological	P	P	P	X	X	-
Non Biological	P	-	P	X	X	-
Colour	-	P	-	P	X	X
Fabric conditioner	-	-	-	X	X	P
In wash fabric conditioner	P	P	P	X	X	P
Fine/delicates wash	-	X	X	X	X	X
Wool wash	X	-	-	X	X	X

key: ADTA - anti dye transfer agent, P = present, X=optional

It will be evident to the person skilled in the art that this principle can be equally applied to other detergent classes besides textile washing compositions, for example, hard surface cleaners, bleaches, washing-up liquids and the like.

Suitable product forms may fall between the various fully formulated products types indicated in the table but can be any of those described, specifically combinations thereof are preferred. More particularly such products as granular detergents and powder are preferred, even more preferably detergent in tableted or similar unit dose forms is most preferred.

The invention will now be further illustrated with reference to the following non-limiting examples and accompanying figures :

Two panels of 100 consumers are supplied with three detergent compositions. Each composition was as supplied to major UK retail outlet under the Logic (TM) name. The three detergent tablet types were the Biological, Colour. The Fine Wash composition, is of composition as described below and is compacted using a Korsch (tm) production press under the typical conditions known to the person skilled in the art to give tablet physical properties akin to those of the commercial tablets. All tablets were of 20g weight each individually flow wrapped in white polyethylene flow wrap bearing a simple descriptor, Biological Wash, Colour Wash, Fine Wash in simple text of their contents. All panellists are soft water users and are instructed to always use tablets of the same kind per wash.

A fine wash tablets composition:

Component	Fine wash %w/w
STP	41.5
G-80 (sodium disilicate granule)	5.00
Sulphopon	
1218GF anionic	20.00
Glucopon 50 G	
alkyl poly glucoside	4.00
CMC	1.50
Bicarbonate	8.00
Lutensol AO7	5.00
nonionic	
Minor components	4.50
Percarbonate	5.00
Norasol XP771 (disintegrant*) ex Norso Haas	1.50
Carbonate (Gran Ash)	4.00
Total %	100

* Optionally an substantially insoluble Cellulosic material may be used.

The first panel is supplied with a partitioned tray containing 8 of each tablet type, the second

panel with a similar tray containing 16 biological, 4 Colour and 4 Fine wash tablets, a third panel is provided with three standard rectangular boxes of 12 tablets one each of Biological, Colour and Fine wash tablets (ie 36 tablets in total per panellist). A fourth panel uses a standard rectangular box of 24 biological detergent tablets only. The panellists are all chosen from Biological detergents users of the brand mentioned and randomised across the three panels. The panellists were instructed to perform 7 washes and complete a simple questionnaire. They all agreed not to use any other textile washing detergent than that supplied for the duration of the test. Panellists are asked to be particularly vigilant for the condition of the washed garments. The packaging is illustrated in Figures 1 to 5. All panellists receive a pack or packs as shown in figure 1 (labelled according to contents). The pack can be divided using a moulded internal partition 5 as shown in figures 3, 4 and 2 for use with panels 1, 2 and both 3 and 4 respectively.

Panellists experiencing;	Panel 1	Panel 2	Panel 3	Panel 4
Dye damage of coloured garments	2	2	7	9
Damage to woollen or silk garments	2	0	2	3
Unremoved stains	1	1	2	1
Total negatives	4	3	11	13

Panel 4 is comparative and shows that sole (forced) use of a biological detergent gave high levels of negatives. Access to the full range of detergents mitigated some of the incidences of negatives. Collation of the three detergents in one package greatly reduced the incidence of negatives with some evidence of better results when the composition was biased to biological detergent tablets. Surprisingly less damage to fine wash (wool silk) garments is experienced when more biological products (ie that most capable of such damage) is supplied. Not wishing to be bound by theory it is hypothesised that the consumers were more selective about using the 'specialist' Fine wash and Colour products when less was supplied, as long as it was supplied.

Panellists using	Panel 1	Panel 2	Panel 3	Panel 4*
One products	0	0	45	95
two products	15	3	51	0
three products	84	95	3	0
Unreported	1	2	1	3

*2 respondents not completing test.

Surprisingly collation of the detergents increased portfolio detergent use considerably. The collation biased towards the biological product, whilst suggesting less potential for selection actually has the opposite effect of improving portfolio usage.

Use of a detergents collation is surprisingly shown to reduce incidence of consumer dissatisfaction in textile washing when using a panel of consumers who were not portfolio users and who in addition effectively became portfolio users (ie more likely different products for different situations) at least for the duration of the test.

Claims

- 1) A packaging system for detergents in which three or more fully formulated products are packaged together each being physically separated from the other using a physical barrier.
- 2) A packaging system as described in claim 1 where the detergents are in separate compartments with a reclosable lid.
- 3) A packaging system as disclosed in claim 1 where the physical barrier is the secondary packaging of a unit dose detergent.
- 4) A packaging system as in claim 3 where the unit dose is a tablet.
- 5) A packaging system as in claim 3 where the unit dose is a sachet.
- 6) A packaging system as in claim 5 where the sachet is water soluble.
- 7) A packaging system as described by both claims 4 and 6.
- 8) A detergent product for textile washing packaged as described in any preceding claim.
- 9) A detergent product as described in claim 8 suitable for domestic textile washing.
- 10) A detergent product as described in claim 8 wherein three or more textile washing detergent compositions are present selected from a biological, non-biological, colour, fine wash in wash conditioning, fabric conditioner and water softener.
- 11) A detergent product or compilation as described in claim 8 wherein three textile washing detergent compositions are present, namely a biological, a colour and a fine wash fully formulated detergents.
- 12) A detergent product or compilation as described in claim 11 wherein the detergent

compositions are present in equal amounts.

12) A detergent product or compilation as described in claim 11 wherein the detergent compositions are present in the ration 2 biological to 1 colour and 1 fine wash detergent by weight, area, surface area or volume.

13) A detergent product or compilation as described in claim 11 wherein the ratio is defined by weight and is in the range 1.5 to 2.5 biological, 0.5 to 1.5 colour and 0.5 to 1.5 fine wash detergent.

14) A detergent product packaging combination substantially as herein described with reference to figures 1, 4 and 5 as herein described.

15) A detergent product packaging combination substantially as herein described with reference to examples used in panels 1 or 2 also as herein described.



Application No: GB 9924143.2
Claims searched: 1-16

Examiner: Stephen Smith
Date of search: 16 December 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8C(CWA3)

Int Cl (Ed.6): B65D; C11D 17/04

Other: ONLINE:EPODOC, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0903405 A2 (UNILEVER) lines 52-57 of page 10	1, 4
X	EP 0798230 A2 (PROCTER & GAMBLE) lines 45-50 of page 2	1, 3, 8, 9
X	US 4397391 (CORNELISSENS) lines 5-13 of column 1; lines 41-48 of column 4	1, 3, 5, 8, 9
X	US 4139114 (LONG) lines 16-30 of column 1	1

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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